

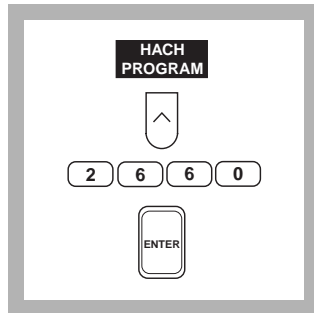


Method 8166

HRDO Method

HR (0 to 15.0 mg/L O₂)

Scope and Application: For water and wastewater.
The estimated detection limit for program number 2660 is 0.1 mg/L O₂.



1. Press the soft key under **HACH PROGRAM**.

Select the stored program number for high range dissolved oxygen by pressing **2660** with the numeric keys.

Press: **ENTER**

Note: Samples must be analyzed on site and cannot be stored; see Sample Collection, Preservation and Storage following these steps.



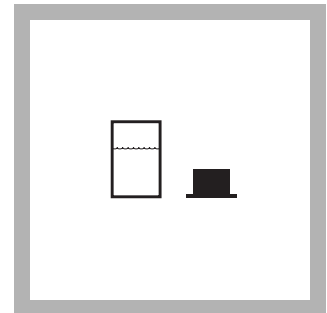
2. The display will show:

**HACH PROGRAM: 2660
O, Dissol. HR AV**

The wavelength (λ), **535 nm**, is automatically selected.

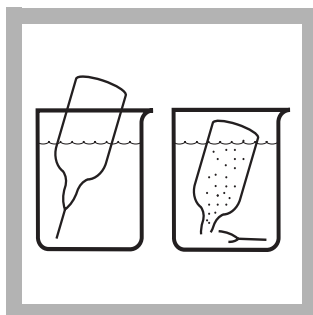


3. Insert the AccuVac Ampul Adapter into the sample cell module by sliding it under the thumb screw and into the alignment grooves. Fasten with the thumb screw.



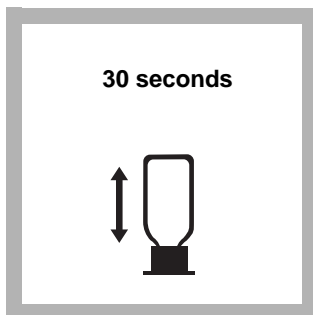
4. Fill a zeroing vial (the blank) with at least 10 mL of sample. Fill a blue ampul cap with sample.

OXYGEN, Dissolved, continued



5. Fill a High Range Dissolved Oxygen AccuVac Ampul with sample.

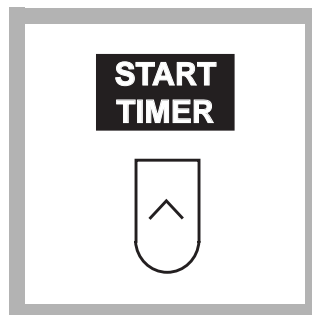
Note: Keep the tip immersed while the ampul fills completely.



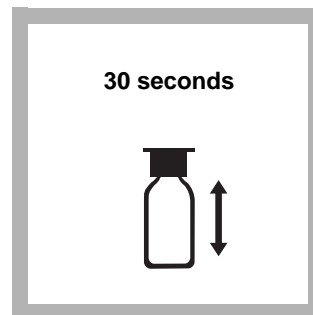
6. Without inverting the ampul, immediately place the ampul cap that has been filled with sample securely over the tip of the ampul. Shake the ampul for approximately 30 seconds.

Note: A small amount of the undissolved HRDO Reagent does not affect results.

Note: The cap prevents contamination with atmospheric oxygen.



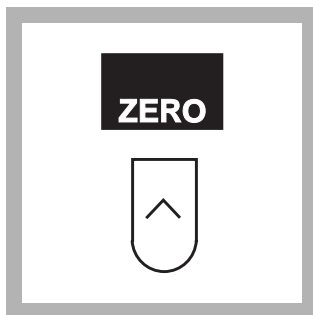
7. Press the soft key under **START TIMER**. This 2-minute reaction period enables oxygen, which was degassed during aspiration, to redissolve and react.



8. When the timer beeps, shake the ampul for 30 seconds.



9. Place the blank into the cell holder. Close the light shield.



10. Press the soft key under **ZERO**.

The display will show:

0.0 mg/L O₂

Note: For alternate concentration units press the soft key under **OPTIONS**. Then press the soft key under **UNITS** to scroll through the available options. Press **ENTER** to return to the read screen.



11. Place the AccuVac Ampul into the cell holder. Close the light shield. Wait approximately 30 seconds for the air bubbles to disperse from the light path. Results in mg/L (or chosen units) dissolved oxygen will be displayed.

Interferences

Interfering Substance	Interference Level and Treatment
Cr ³⁺	Greater than 10 mg/L
Cu ²⁺	Greater than 10 mg/L
Fe ²⁺	Greater than 10 mg/L
Mg ²⁺	Magnesium is commonly present in seawater and causes a negative interference. If the sample contains more than 50% seawater, the oxygen concentration obtained by this method will be 25% less than the true oxygen concentration. If the sample contains less than 50% seawater, the interference will be less than 5%.
Mn ²⁺	Greater than 10 mg/L
Ni ²⁺	Greater than 10 mg/L
NO ₂ ⁻	Greater than 10 mg/L

Sample Collection, Preservation and Storage

The main consideration in sampling with the High Range Dissolved Oxygen Ampul is to prevent the sample from becoming contaminated with atmospheric oxygen between breaking open the ampul and reading the absorbance. This is accomplished by capping the ampul with an ampul cap. If the ampul is securely capped, the ampul should be safe from contamination for several hours. The absorbance will decrease by approximately 3% during the first hour and will not change significantly afterwards.

Sampling and sample handling are important considerations in obtaining meaningful results. The dissolved oxygen content of the water being tested may change with depth, turbulence, temperature, sludge deposits, light, microbial action, mixing, travel time and other factors. A single dissolved oxygen test rarely reflects the accurate over-all condition of a body of water. Several samples taken at different times, locations and depths are recommended for most reliable results. Samples must be tested immediately upon collection, although only a small error results if the absorbance reading is taken several hours later.

Accuracy Check

The results of this procedure may be compared with the results of a titrimetric procedure (request Lit. Code 8042) or Portable Dissolved Oxygen Meter (Cat. No. 50175-00).

Method Performance

Precision

Standard: 8.0 mg/L O₂

Program	95% Confidence Limits
2660	7.9–8.1 mg/L O ₂

For more information on determining precision data and method detection limits, refer to Section 1.5.

Estimated Detection Limit

Program	EDL
2660	0.1 mg/L O ₂

OXYGEN, Dissolved, continued

For more information on derivation and use of Hach's estimated detection limit, see Section 1.5.2. To determine a method detection limit (MDL) as defined by the 40 CFR part 136, Appendix B, see Section 1.5.1.

Sensitivity

Program Number: 2660

Portion of Curve	Δ Abs	Δ Concentration
0.010 Abs	0.010	0.12 mg/L
7.5 mg/L	0.010	0.08 mg/L
13.5 mg/L	0.010	0.08 mg/L

See Section 1.5.3 *Sensitivity Explained* for more information.

Summary of Method

The High Range Dissolved Oxygen AccuVac Ampul contains reagent vacuum sealed in a 12-mL ampul. When the AccuVac Ampul is broken open in a sample containing dissolved oxygen, it forms a yellow color which turns purple. The purple color development is proportional to the concentration of dissolved oxygen.

Safety

Good safety habits and laboratory techniques should be used throughout the procedure. Consult the *Material Safety Data Sheet* for information specific to the reagents used. For additional information, refer to Section 1.

Pollution Prevention and Waste Management

For information on pollution prevention and waste management, refer to Section 1.

REQUIRED REAGENTS AND STANDARDS

Description	Quantity Required per test	Unit	Cat. No.
High Range Dissolved Oxygen AccuVac Ampuls, 0–10 mg/L with 2 reusable ampul caps	1 ampul	25/pkg	25150-25

REQUIRED EQUIPMENT AND SUPPLIES

Beaker, 50-mL	1	each	500-41
Caps, ampul, blue	1	25/pkg	1731-25
DR/4000 AccuVac Ampul Adapter	1	each	48187-00
Sample Cell, 10-mL with cap (zeroing vial)	1	each	21228-00

OPTIONAL REAGENTS AND EQUIPMENT

AccuVac Ampul Dissolved Oxygen Sampler	each	24051-00
AccuVac Snapper	each	24052-00
BOD bottle and stopper, 300-mL	each	621-00
sens ^{ion} ™6 Dissolved Oxygen Meter, with probe	each	51850-10

Note: Dissolved oxygen may also be determined by titrimetric methods.
Request Publication 8042 for additional information.



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In the U.S.A. – Call toll-free 800-227-4224
Outside the U.S.A. – Contact the HACH office or distributor serving you.
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HACH COMPANY
WORLD HEADQUARTERS
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